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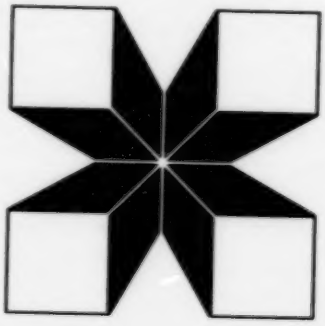

CANADA

MICROFISHERIES OF SMALL WATER BODIES IN AFRICA

AN ANNOTATED BIBLIOGRAPHY

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Microfisheries of small water bodies in Africa

An annotated bibliography

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FOREWORD

Microfisheries have in the past been almost routinely bypassed by fisheries development programmes in Africa. Most research and development effort in inland fisheries has (understandably) focused on large lakes, floodplains, reservoirs and coastal lagoons. Many of these macrofisheries are now approaching full exploitation and there is a need to identify new opportunities for increasing fish production. Theoretically, intensive pond aquaculture (and its relatives cage- and penculture) offers an almost limitless potential. However, for a variety of reasons related to input and management costs, intensive aquaculture has failed to undergo a development 'boom' in Africa, and, after more than three decades of development attempts, it accounts for less than 1% of all African fish production.

Concern for food security in the short and medium term future has led pragmatic fisheries reearchers and administrators to reassess the fisheries potential of small water bodies. Possessing well over 20,000 small lentic bodies (natural lakes, swamps, dams, coastal lagoons) and some 12.7 million km of small river channels, it is evident that very substantial surface water resources exist. No reliable estimate of current microfisheries production for Africa is available. But potential yield may be in the order of at least 1 million tons/annum, and this could be markedly increased with minimal expenditure by a variety of indigenous production enhancement methods.

Relatively high population densities around small water bodies suggests that good management practices augmented by periodic stocking are essential for sustaining production at high level and preventing overexploitation/resource collapse. Given the past low research priority, the current microfisheries state-of-art is not adequate for sound development planning. This situation is changing and microfisheries are beginning to emerge as a distinct field of fisheries research and development. This annotated bibliography has been prepared to provide fisheries researchers and administrators with better access to the available literature. Although uneven in terms of focus (i.e. some publications address microfisheries or small water body environments directly, while others refer to them only incidentally), the 200+ assembled titles indicate that a scientific data base does exist and requires collation, analysis and synthesis.

The Fisheries Program of IDRC provides on-going support to fisheries researchers in developing countries who are conducting research into diverse aspects of development of microfisheries in small reservoirs and other aquatic habitats.

Garry M. Bernacsek
IDRC Fisheries Program Officer (Africa and Middle East)

1. INTRODUCTION

Over the years a substantial body of information has been built upon the fish and fisheries of the African continent. Most of these works however, have been centred on either the marine resource base or on the large inland water bodies. Fish are the most important source of animal protein in many African states. Unfortunately a number of large African fisheries have been found to be operating at or near their maximum sustainable yields. Given that the requirements for fish is increasing with population growth and changes in nutritional trends, attention must now be focussed on the small water bodies so as to develop their resources.

As a first step, the need to have a list of available literature in the field of African small water body fisheries is recognised. For the purpose of this bibliography a small water body is defined as any standing water body with an area not more than 10 km^2 and any running water with a length of less than 100 km. Fish ponds and any water body under semi-intensive or intensive aquaculture are not included. The aim of the bibliography is twofold; first to document the current state of knowledge of small water body fisheries in Africa and secondly to serve as a means of pinpointing the data gaps which need to be filled by additional research.

The bibliography is aimed at research workers and planners in fisheries development, as well as other workers concerned with assessing the present and potential levels of exploitation of small water bodies. In order to be as comprehensive as possible the compilation includes references on Socio-economics, fish biology, ecology, fishing gear, policy and management.

The research for the bibliography was carried out by consulting library material. The FAO Fisheries Branch library and the David Lubin Memorial Library, FAO, Rome were extensively used.

Some information was also derived from the Balme Library, University of Ghana, Legon. In all, over three thousand documents were consulted, these ranged from papers published in international journals to mimeographed national reports in the FAO country files. A literature search using the online version of Aquatic Sciences and Fisheries Abstracts (1979-1989) was also made. This yielded 25 references; of which nine had relevant material.

A number of key documents have been included in the bibliography. Bernacsek (1986) identified the area, and drew attention to the potential that small water bodies have for fishery development in Africa. The FAO Series on National reviews on Aquaculture (Balarin/Chondoma/Deceuninck) all contain valuable information on

small water body fisheries. The directory of African wetlands and shallow water bodies (Burgis and Symoens, 1988) and its companion bibliography (Davies and Gasse, 1988) produced by ORSTOM provide substantial body of information. Two documents currently under preparation which contain much useful data are the FAO Source-book for the Inland Fisheries of Africa and the Proceedings of the 7th Session of the FAO Committee for the Inland Fisheries of Africa (Giasson and Gaudet, 1989) which was centred around small water body fisheries.

The body of the bibliography is in sections according to the main types of water bodies with the citations in each section arranged alphabetically by author and then chronologically by date of publication within each author entry. Two indices are provided, a country index and a subject index. Each entry contains the fullest possible bibliographic information so as to facilitate access. A short annotation is also provided by the compiler in most cases so as to aid the user of the bibliography select the most relevant documents.

Although efforts were made by the compiler to make the bibliography as complete as possible given the resources provided, there would, undoubtedly, be some reference ommitted. Suggestions for corrections and additions would be must appreciated.

2. BIBLIOGRAPHY

2.1 General

A

1. Amirthalingam, C., and M. El Yasaa Khalifa 1956. A guide to the common commercial freshwater fishes in the Sudan. Game and Fisheries Department, Republic of Sudan 197 p.

   A brief description of fisheries and fishing methods is given.

   FB, FG, FM

2. Anderson, A. 1989. The development and management of fisheries in small water bodies. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana, 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.).

   The potential offered by small water bodies and river systems is discussed. The paper outlines some of the problems that may arise with the development of small water body fisheries and suggests that governments should consider low key regulatory measures and strengthen traditional management practices.

   FP, FY, M, P, RD

3. Asafo, C.K. 1989. The fishery potential of small water bodies in Ghana. In: M. Giasson and J.L. Gaudet (eds.). Symposium on the development of management of small water bodies. Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.)

   The author considers the rational exploitation of fisheries production in small water bodies as a possible solution to the problems of over-exploitation of the country's marine resources. Using the established fisheries policies as a base, efforts should be directed to implementing new strategies especially in regard to fisheries management and training.

   FP, FY, MG, P, T.

B

4. Balarin, J.D. 1984a. National reviews for aquaculture development in Africa. 1. Zimbabwe. FAO Fish. Circ., (770.1): 69p.

   AC, FP, G

5. Balarin, J.D. 1984 b. National reviews for aquaculture development in Africa, 2. Liberia. FAO. Fish. Circ., (770.2): 45p;.

AC, FP, G

6. Balarin, J.D. 1984 c. National reviews for aquaculture development in Africa. 3. Sierra Leone. FAO Fish. Circ., (770.3): 55 p.

AC, FP, G

7. Balarin, J.D. 1984 d. Etudes nationales pour le développement de l'aquaculture en Afrique. 4. Togo. FAO Circ. Pêches, (770.4): 66p

AC, FP, G

8. Balarin, J.D. 1984 e. Etudes nationales pour le développement de l'aquaculture en Afrique. 5. Benin. FAO Circ. Pêches, 770.5): 52 p

AC, FP, G

9. Balarin, J.D. 1985 a. National reviews for aquaculture development in Africa. 6. Cameroon. FAO. Fish. Circ., (770:6): 88p

AC, FP, G

10. Balarian, J.D. 1985 b. National reviews for aquaculture development in Africa. 7. Kenya. FAO. Fish. Circ., (770.7): 96 p

AC, FP G

11. Balarin, J.D. 1985 c. National reviews for aquaculture development in Africa. 9. Ethiopia. FAO. Fish. Circ., (770.9): 109 p.

AC, FP, G

12. Balarin, J.D. 1985 d. National reviews for aquaculture development in Africa. 10. Uganda. FAO. Fish. Circ., (770.10): 109 p

AC, FP G

13. Balarin, J.D. 1985 e. National reviews for aquaculture development in Africa. Tanzania. FAO. Fish. Circ., (770.11): 105 p.

AC, FP, G

14. Balarin, J.D. 1986 a. National reviews for aquaculture development in Africa. 8. Egypt. FAO. Fish. Cir., (770.8): 128 p.

AC, FP, G

15. Balarin, J.D. 1987. National reviews for aquaculture development in Africa. 12. Malawi. FAO. Fish. Cir., (770.12) : 82 p

AC, FP, G

16. Balarin, J.D. 1988 a. National reviews for aquaculture development in Africa. 17. The Sudan. FAO. Fish. Circ., (770.17): 118 p.

AC, FP, G

17. Balarin, J.D. 1988 b. National reviews for aquaculture development in Africa. 18. Ghana. FAO. Fish. Cir., (770.18): 121 p.

AC, FP, G

18. Baziramwabo, T., and J. Reremsesha 1989. Problèmes liés au développement et à l'aménagement des pêches dans les petits plans d'eaux en République Rwandaise. In M. Giasson and J.L. Gaudet (eds.). Symposium on the development and management of small water bodies, Accra, Ghana. 7-8 December 1987. Summary of proceedings and selected papers FAO Fisheries Report (in prep.).

The authors list 19 small water bodies and discuss the main problems related to fisheries development in Rwanda small water bodies. These problems are related to inadequate funding and to lack of suitably qualified staff.

FP, SE, T

19. Beadle, L.C. 1974. The inland waters of tropical Africa. An introduction to tropical limnology. Longman, London, 352 p

A general text on limnology with a chapter devoted to temporary saline and thermal waters.

EG, G, L

20. Bellemans, M. 1989. Problems associated with the gathering of information on small water bodies in Africa. In M. Giasson and J.L. Gaudet (eds.). Symposium on the development and management of small water bodies. Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO.Fisheries Report (in prep.).

Stress is laid on the fact that the overall potential of small water body fisheries has never been properly evaluated. The author suggests that priority should be given to the collection of basic quantitative and qualitative data, i.e., an inventory, their characteristics, present and potential levels of exploitation so as to assist decision-makers.

FP, FY, MGP

21. Bernacsek, G.M. 1980. Introduction to the freshwater fishes of Tanzania Department of Zoology, University of Dar es Salaam (mimeo) 78 p

In a section on freshwater fisheries, the author discusses minor water bodies touching on their value to the rural population.

FB, RP

22. Bernacsek, G.M. 1986. Fisheries in small water bodies: An overview of their potential for supplying animal protein to rural populations of Africa. In J.L. Gaudet and D. Parker (eds.). Symposium on the planning and implementation of fisheries management and development programmes. Lusaka, Zambia 7-9 October 1985. Summary of proceedings and selected papers. FAO.Fisheries Report No. 360: 77-91

In this key paper, the importance of small water bodies as a fishery resource is discussed. Estimates of the potential yield are given and a program for the long term development of small water bodies is presented.

P, RD, RP

23. Blanche, J., F. Miton and A. Stauch 1962. Première contribution à la connaissance de la pêche dans le bassin hydrographique Logone-Chari-Lack Tchad. Mémoire 'ORSTOM no. 4 pt. 1 Paris, 143 p.

General aspects of the fishery of the basin are given, the fishing methods in use are described.

FG, FM, G

24. Bowmaker, A.P. 1975. Protein production from fresh water with particular reference to Rhodesia. Rhod. Sci. News, (7): 212-6

RP

25. Brandt, A. von 1972. Fish catching methods of the world. Fishing News (Books) West Byfleet, Surry. 240 p.

A number of African methods of fishing in small water bodies are described.

FG, FM G

26. Burgis, M.J. and J.J. Symoens (eds.) (1987). African Wetland and shallow water bodies: Directory Institut Français de Recherche Scientifique pour le Développement en Coopération. Collection Travaux et Documents No 211, 650 p.

An important listing of the basic characteristics of many African small water bodies.

E, EN, G, H, L

C

27. Cheney, D.P. and H.R. Rabanal 1984. Remote sensing and its application to inland fisheries and aquaculture. FAO Fisheries Circular (768): 50 p.

The author discusses the role satellite imagery and aerial photography can play in the mapping and characterization of inland waters.

AC, EM, G, FP

28. Chondoma, E.C. 1988 a. National reviews for aquaculture development in Africa. 19. Lesotho. FAO. Fish. Circ., (770.19): 132 p.

AC, FP, G

29. Chondoma, E.C. 1988 b. National reviews for aquaculture development in Africa. 20. Swaziland. FAO. Fish. Circ., (770.20): 104 p.

AC, FP, G

30. Cole, R.C. 1977. Fisheries extension services - their role in rural development. Mar. Policy 1 (2): 132-142

A presentation is made on how the small-scale fisheries sector can be developed by an efficient fisheries extension services. Stress is laid on the fact that the extension service can only function effectively when the community accepts its activities as being an essential part of the community life.

EX, FY, RP, SE

D

31. Davies B. and F. Gasse (eds.) 1988. African wetlands and shallow water bodies: Bibliography. Institut Français de Recherche Scientifique pour le Développement en Coopération. Collection Travaux et Documents No. 211, 502 p.

A companion volume to Burgis and Symoens (1987) giving listings of references arranged according to subject areas within geographic groupings.

BB

32. Deceuninck, V. 1985. Études nationales pour le développement de l'aquaculture en Afrique. 13. République centrafricaine. FAO Circ., Pêches, (770.13): 68 p.

AC, FP, G

33. Deceuninck, V. 1988 a. Études nationales pour le développment de l'aquaculture en Afrique. 15. Congo. FAO Circ., Pêches, (770.15): 81 p.

AC, FP, G

34. Deceuninck, V. 1988 b. Études nationales pour le développement de l'aquaculture en Afrique. 16. Gabon. FAO Circ., Pêches, (770.16) : 60 p.

AC, FP, G

35. Deceuninck, V. 1989 a. Études nationales pour le développement de l'aquaculture en Afrique. 23. Burkina Faso. FAO Circ., Pêches, (770.23): 87 p.

AC, FP G

36. Deceuninck, V. 1989 b. Études nationales pour le développement de l'aquaculture en Afrique. 25. Mali. FAO Circ., Pêches, (770.24): 98 p.

AC, FP, G

37. Deceuninck, V. 1989 c. Études nationales pour le développement de l'aquaculture en Afrique. 25. Sénégal. FAO Circ., Pêches, (770.25): 96 p.

AC, FP, G

F

38. FAO/UN 1973. Symposium on the evaluation of fishery resources in the development and management of inland fisheries. Fort-Lamy, Chad, 29 November - 1 December 1972. CIFA Tech. Pap., (2): 20 p.

A summary of discussions on the development of small scale fisheries is presented and a recommendation on the establishment of a working group on the development and management of artisanal fisheries is given.

FP, FY, RD

39. FAO/UN 1978. Role of fishery technology in the development of inland fisheries in Africa. In R.L. Welcomme (ed.). Symposium on the river and flood plain fisheries in Africa. Bujumbura, Burundi, 21-23 November 1977. Review and experience papers CIFA Tech. Pap. (5): 357-373.

This paper based on the work of P. Morissens and P. Lessent describes the types of promotional aid including manpower training and extension work which are required for the various types of small water bodies in Africa.

EX, RD, T

40. Fortes, M. 1937. Communal fishing and fishing magic in the Northern Territories of the Gold Coast, Man, R. Anthropol. Inst. G. B. Ire: 131-142.

FM, SE

G

41. Gaudet, J.L. and Parker, D. (eds.). Summary of proceedings and selected papers symposium on the planning and implementation of fisheries management and development programmes in Africa. Lusaka, Zambia, 7-11 October 1985, FAO Fish. Report, (360): 155 p.

In the summary report of the proceedings of the symposium, the editors present a section on fisheries management in rivers and small water bodies. In that section, the need for FAO to continue their inventory of the inland waters of Africa with a view to develop their full potential is stressed.

MG, P. RD

42. Gerhardsen, G.M. 1970. Strategies for development projects in small-scale fisheries. FAO Fisheries Circ., (713): 30 p.

This document which is meant to be a guideline for fisheries administrators, discusses how small-scale fishery development projects can be prepared and gives some consideration on the problems that may be encountered.

FP, FY, RD

43. Giasson, M. and J.L. Gaudet (eds.) 1989. Summary of proceedings and selected papers, symposium on the development and management of fisheries in small water bodies. Accra, Ghana 7-8 December 1987. FAO Fisheries Report (in prep.)

The editors in their introduction, report on the views tabled at the symposium by the participants about the importance and potential role of small water body fisheries in Africa. A number of resolutions were put forward for action by the FAO Committee for the Inland Fisheries of Africa.

FP, FY, P, RD

H

44. Hendrix, M., T. Brainerd and T. Omara-Alawa 1984. A working bibliography on East Africa Fisheries. International Centre for Marine Resource Development, University of Rhode Island. 67 p.

The authors cover the period 1889-1980 and cite 568 references. Freshwater and marine fisheries as well as aquaculture are treated in Kenya, Tanzania, Uganda, Burundi, Zaire, Malawi, Zambia, Somalia, Sudan, Seychelles and Mauritius.

BB

I

45. Ibeun, M.O. 1979. Kainji Lake Basin, Nigeria: A multi-disciplinary bibliography 1957-1978. Kainji Lake Research Institute, Technical Report series (4): 72 p.

BB

46. Irvine, F.R. 1947. The fishes and fisheries of the Gold Coast Crown Agents London: 352 p.

A number of indigenous fishing gear and methods are described.

FB, FG, FM

J

47. Jackson, P.B.N. 1961. The fishes of Northern Rhodesia, Lusaka, Zambia Government Printer. 140 p.

FB

48. Jul-larsen, E. 1981. Some Socio-economic aspects influencing market integration and development of African fresh water fisheries. Development Research and Action Program Working paper A202. The Ctir. Michelsen Institute Norway. 38 p.

The author points out that the nutritional importance of African fresh water fisheries is significant and trends in development must be carefully examined. The paper attempts to show how conditions of market integration differ with reference to adaptation and the traditional organization of production.

FP, MK, RP, SE

K

49. Kambona, J.J. 1975. Freshwater fishes in Tanganyika FAO/UN Regional Office for Africa, Accra. 275 p.

The author in a section on freshwater fisheries points out that the scattered diverse and remote nature of the small fisheries presents special problems to marketing and distribution of catch as well as planning the modernization of the industry. The catch for minor waters for the years 1969-1973 is presented.

CS, FB, FP, MK, RP, SE

L

50. Lawson, R.M. 1977. New directions in small-scale fisheries. Mar. Policy 1 (1): 45-51.

Based on socio-economic data on the operations of small-scale fisheries in developing countries, the author questions established concepts on the constraints which are thought to limit development.

FY, R, SE

51. Lévêque, C., M.N. Bruton and G.W. Ssentongo (eds.) 1988. Biology and Ecology of African freshwater fisheries. Editions de l'ORSTOM. Collection Travaux et Documents (216). Paris. 508p.

A synthesis of current knowledge of the fresh water fish fauna of Africa. Main themes are: systematics and biogeography, physiology; biology; fish communities; management and conservation.

EC, FB, G. MG

52. Lowe-McConnell, R.H. 1975. Fish communities in tropical fresh waters. Longman, London, 337 p.

A general text of tropical ecosystems, Africa well treated. An appendix on representative fish fauna of some African rivers and lakes is given.

EC, EM, FB, G, L

M

53. Matthes, H. 1973. A bibliography of African freshwater fish. FAO Rome. 299 p.

BB

54. Mattes H. 1978. The problem of rice-eating fish in the central Niger Delta, Mali. In: R.L. Welcomme (ed.) Symposium on river and flood plain fisheries in Africa, Bujumbura, Burundi, 21-13 November 1977. Review and experience papers CIFA Tech. Paper (5): 225-252.

The author provides a detailed and well illustrated survey of the problem, the paper focuses on the species causing damage, the extent of damage caused and goes on to discuss various ways of alleviating the problem. The conflict between farmers and fishermen are also presented.

EC, F, SE

55. Merrikin, P. 1987. Women in fisheries - A selective annotated bibliography FAO. Fish. Circ. No. 811. 34 p.

A collection of 133 references, 38 of them from Africa on the role of women in fisheries. The earliest reference is 1971 and most date from the 1980s.

BB, W

56. Mulala, S.A. 1986. Stocks management policies as related to the development of small-scale fisheries in Zambia. In: Groupe d'étude des ressources maritimes Université du Quebec à Rimouski. Proceedings of the International Conference of the Group d'étude des ressources maritimes on small-scale fisheries and Economic Development, and the Third Biennial Conference of the International Institute of Fisheries Economics and Trade, Developments and Policies. August 10-15, 1986 Rimouski, Canada ; 961-966

The author argues for the proper management of small-scale fisheries.

FY, MG, RD

R

57. Rabelahatra, A. 1988. Etudes nationales pour le développement de l'aquaculture en Afrique. 22 . Madagascar, FAO Fish. Circ. No. (770.22): 82 p.

AC, FP, G

58. Regier, H.A. 1982. Training course on the management of small-scale fisheries in the inland waters of Africa: Conceptual framework and approaches for the acquisition of key resource information FAO Fish. Cir. No. 752: 25 p.

A short course for the training of managers of small scale fishing resources is presented.

EX, T

59. Robinson, M.A. and R. Lawson 1986. Some reflections on aid to fisheries in West Africa. Mar. Policy 10 (2): 101-110.

The authors review the reasons for the lack of success of projects to assist the growth and development of fisheries in West Africa. The possible reasons for these disappointments and some suggestions on ways to avoid them are given.

FY, SE

S

60. Saila, S.B. 1980. Some environmental considerations for stock assessment of small scale fisheries. In: S.B. Saila and P.M. Roedel Eds. stock assessment of tropical small scale fisheries. Proceedings of an international workshop. September 19-21 1979, Kingston, R.I., U.S.A. International Center for Marine Resources Development: 60-69.

The author gives a general overview of the topic, and uses inland waters as one of the environments of small-scale fisheries based on mainly African material.

EN, ST

61. Saila, S.B., and P.M. Roedel (eds.). 1980. Stock assessment for tropical small-scale fisheries. Proceedings of an international workshop, September 19-21 1979., Kingston R.I., U.S.A International Center for Marine Resource Development: 198 p.

This volume presents experience and perspactive papers in 15 aspects of small-scale fisheries.

ST

T

62. Trottier, B. 1979. Women in aquaculture production in West Africa. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana, 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.).

Mention is made of some fishing methods traditionally practiced by women in: Congo, Gabon, Gambia, Ghana, Liberia, Nigeria, Senegal and Zaire.

AC, RD, W

2.2 Small Rivers and Floodplains

A

63. Adeniji, H.A. 1979. Waterfalls and dissolved oxygen concentration; possible effects on the fishery of the proposed Jebba Lake. In: Kainji Lake Research Institute; Proceedings of the International Conference on Kainji Lake and River Basin Development in Africa. Ibadan, Nigeria, 11-17 December 1977: 178-183.

The effects of innundation of rapids and closure of the spillgates of the Kainji dam is discussed in relation to downstream fishery development.

FP, H, L, R, D

64. Aiyedun, B.A. and J.D. Adegboye 1967. River fisheries in Northern Nigeria. Nig. Field 32: 160-170.

The authors present a simple non-technical account of the fish catch and marketing from the rivers in the area to be flooded by the Kainji Lake.

CS, MK, RD

65. Awachie, J.B.E. and E.C. Walson 1978. The Atalla fishery of the lower Niger, Nigeria. In: R.L. Welcomme (ed.) Symposium on the river and floodplain fisheries in Africa. Bujumbura, Burundi 21-23 November 1977. Review and experience papers CIFA Tech. Pap. (5): 296-311.

The paper presents information on the use of lift nets (locally known as atalla) in the fishing industry of the lower Niger. Details of gear operation and the productivity of the fishery are given.

CS, FG, FM

66. Awachie, J.B.E., P.C.O. Ilczumba and W.I. Azugo 1978. Fish parasites in the ecology, management and productivity of flood-plain fisheries in Africa. In: R.L. Welcomme (ed.) Symposium on river and floodplain fisheries in Africa, Bujumbura, Burundi.

E, FB

B

67. Badenhuizen, G.R. 1965. Lufubu River - Research notes Fisheries Research Bulletin 1963-64. The Game and Fisheries Department, Ministry of Lands and Natural Resources, Zambia, p. 11-45 (mimeo).

The local fishery of the Yendwe Valley is described and information on hydrology and gill-netting at eight stations is presented. Four main species of fish were important Hydrocynus vittatatus; Alestes macrophthalmus; Citharinus gibbosus and Barbus tropidolepis.

FB, FG, H

68. Balirwa, J.S. and F.W.B. Bugenyi 1980. Notes on the fisheries of the River Nzoia, Kenya Biol. Cons. 18 (1): 53-58

The authors present some information on the fisheries and physico-chemistry of the river. They suggest that the fisheries depend largely on seasonal flooding regimes which result in the ascent of migrant fishes from Lake Victoria.

FB, H, L

69. Bell-Cross, G. 1971. Weir fishing on the centre Barotse flood plain in Zambia. Fish. Res. Bull. Zambia, 5: 331-340.

The author describes the fish weir used traditionally in the area and gives estimates of annual harvest. Details of catch composition are also given.

CS, FM

C

70. Carey, T.G. 1967. Kafue river and floodplain research: fish populations in lagoons and riverine environments. Fish. Res. Bull. Zambia 3: 9-12

The author presents the results of an experimental gill netting programme to sample lagoons in the Kafue river floodplain area. The population of all fish species were found to be smaller in the Chiansi lagoon that at the Namwala arm.

FB

D

71. Daget, J., N. Planquette and P. Planquette 1973. Premières données sur la dynamique des peuplements de poisson subissant un arrêt annuel prolongé du Bandama (Côte d'Ivoire) Bull. Mus. Natn. Hist. nat., (Paris 3m ser.) 151: 129-143

Estimates of catch per unit area are given for a back water on the Bandama River.

CS

72. Drammeh, O.K. 1981. Year book of the fisheries statistics of the Gambia Fisheries Department, Ministry of Water Resources and Environment Publication No. 35.

Presents tables of catch statistics of both marine and inland fisheries for the period 1980/81.

CS

F

73. FAO/UN 1977. Investigations of the Okavango Delta as a primary water Resource for Botswana UNDP/FAO Gaborone AG: DP/BOT/71/506 Tech. Report Vol. 1. 192 p.

The fisheries section of this document, based on the work of P. Fox and C. Gilmore, give data on the fish yield of small madibas and lagoons in the Delta area.

CS

74. Fox, P.J. 1976. Preliminary observations on fish communities of Okavango Delta. In: Botswana society, proceedings of the symposium on the Okavango Delta and its future utilization. Gaborone, Botswana, 30 August - 2 September 1976: 125-130

Catch estimates from cattle dung enriched floodplain pools are compared with unenriched pools in the Okavango Delta.

AC, CS

G

75. Gruvel, A. 1908. Les pêcheries des Côtes du Sénégal et des rivières du Sud. Gouvernement Général de l'Afrique Occidentale Française. Paris 245 p.

An early overview of fisheries in Senegal. A number of indigenous fishing methods used are described.

FG, FM

H

76. Holden, M.J. 1963. The populations of fish in dry season pools of the R. Sokoto Fishery Publs. Colon. Off., 19: 1-58.

FB

77. Holden, M.J. 1967. Further notes on fishing methods in Northern Nigeria, Nig. Field 32: 27-32.

The author gives a description of the various fishing methods used in the area to be flooded by the Kainji Lake.

FM

78. Hyslop, E.J. 1987. Aspects of the biology of Hemichromis bimaculatus from a small stream in Nigeria. J. Fish Biol. 31: 745-751.

The biology of Hemichromis bimaculatus, a popular aquarium fish, is described.

FB

K

79. Kapetsky, J.M. 1974. Growth, mortality and production of five fish species of the Kafue River floodplain. Zambia. Ph.D. Thesis, University of Michigan. 194 p.

Estimates of the standing stocks of the main commercial species in three reaches of the Kafue River are given.

CS, FB

80. King, H. 1979. A review of the state of fisheries in the Gambia. Republic of Gambia Fisheries Publication No. 32: 25 p.

Catch for the upper Gambia river is given

CS

L

81. Lesack, L.F.W. and O.K.L. Drammeh 1980. Distribution of effort and structural aspects of the artisanal fishery in the Gambia. Republic of Gambia Fisheries Publication, No. 33: 27 p.

Figures for a one point in time, enumeration of effort distribution in river fisheries are given.

CS

82. Lotti, C. 1979. Systems analysis applied to water management in developing countries. In: Kainji Lake Research Institute, Proceedings of the International Conference on Kainji Lake and river basins development in Africa. Ibadan, Nigeria 11-17 December 1977: 37-43

The paper describes the use of systems analysis techniques in planning, using the Sankarani river as an example.

FP

M

83. McEachern, J., and J.G. Hunter 1982. Sealife Project, Sierra Leone Project. Identification and prefeasibility report. Ministry of Development and Economic Planning, Freetown, Sierra Leone. 107 p.

G, RD

84. Malaisse, F. 1976. Ecologie de la rivière Luanza. J.J. Symoens (ed.) Cercle hydrobiol. de Bruxelles. 151 p.

Estimates on the ichthyomass of the river are given.

ST

85. Matthes, H. 1967. The fish and fisheries of the Ruaha river basin, Tanzania (Systematics, Ecology, Zoogeography, Fisheries) East African Freshwater Fisheries Research Organization. Occasional Paper (9): 19 p.

A report on the first survey of the Ruaha river and some of its fisheries. Details of the fish caught and data on their ecology are presented.

EC, FB

86. Mortimer, M.A.E. 1965. Fish production from a stream in Northern Rhodesia. In: Proceedings of the Central African Scientific and Medical Congress, Lusaka, 1963, pp 405-414.

CS

87. Moses, B.S. 1979. The Cross river, Nigeria, its ecology and fisheries. In Kainji Lake Research Institute. Proceedings of the International Conference on Kainji Lake and river basins development in Africa. Ibanda. Nigeria 11-17 December 1977: 355-370.

The annual yield of a small reservoir fishery at Ogoja is presented.

EC, CS

O

88. O'Keeffe, J.H., D.B. Danilewitz and J.A. Bradshaw 1987. An 'expert system' approach to the Assessment of the conservation status of Rivers. Biol. Conserv. 40 (1): 69-84.

The authors include fish as a factor in weighting of attributes of Rivers.

G, RD

89. Ojike, N.A. 1980. Unconventional fishing methods in the Anambra and Imo river basins, Nigeria 3(3): 9

The use of chemicals and explosives and their effect on the environment is described. The fact that the fishermen who use these illegal methods, form cooperatives is noted, the author goes on to describe the various control measures which may solve the problem.

EN, FM, FY

P

90. Penczak, T., and M. Molinski 1984. Fish production in Oued Sebaou, a seasonal river in North Algeria. J. Fish Biol. 25: 723-732.

The authors used electrofishing to determine the ichthyomass of Barbus callenis and Anguilla anguilla. Data on mean density standing crop, estimated average biomass and estimated average production are presented.

CS, FB, ST

Q

91. Quensière, J. 1976. Influence de la sécheresse sur les pêcheries du delta du Chari (1971-1973) Cah. O.R.S.T.O.M., ser Hydobiol., vol. X, no. 1: 3-18

The effects of hydrological changes within the Chari delta on fish catch (unit effort catch, total fish effort, total catch) are given. Changes in fish population and fishermen migration are also presented.

CS, FB, H

R

92. Republic of Kenya/Colony and Protectorate of Kenya 1947-1966. Review of Kenya fisheries (up to 1955)/Report on Kenya fisheries. For the years 1939-45; 1946 and 1947; 1948-66.

These reviews and reports, written by H. Copley up to 1955, provide an account and record of the development of fisheries in Kenya. Details of catch statistics for trout are given in the early years.

CS, RD

93. République du Mali/République Française 1964. Traitement et commercialisation du poisson pêché dans le délta central du Niger: Tome I, Analyse de la situation actuelle. Société d'Etudes pour le Développment Economique et Sociale, Paris 198 p.

This volume (one of two) gives an account of the fish, fisheries of the inland delta of the Niger.

94. Reizer, C. 1974. Définition d'une politique d'aménagement de ressources halieutiques d'un écosystème aquatique complexe par l'étude de son environnement abiotique et anthropique. Le fleuve Sénégal moyen et inférieur. Docteur en sciences de l'environnement. Dissertation Arlon Fondation Universitaire Luxembourgeoise, 4 vol 525 p.

An estimate of the yield of floodplain pools is given, long narrow pools having a higher ichthyomass than round pools.

ST

S

95. Scudder, T. and T. Conelly 1985. Management systems for riverine fisheries. FAO Fish Tech. Pap., (263): 85 p.

The authors outline the strategies used to manage river fisheries. African examples are used extensively.

MG

96. Skjønsberg, E. and Y. Merafe 1987. The Okavango fisheries socio-economic study, Ministry of Agriculture, Botswana and Ministry of Development cooperation Norway, 69 p.

The authors discuss the availability of fish in the Okavango River Delta and comment that following the withdrawal of the river the fish are concentrated in the smaller rivers and pools.

FB, MK, SE

97. Spence, A. 1966. Fishing gear and effort survey on the Chambesi River. Fish Res. Bull. Zambia, 4: 91-93.

This short paper describes an investigation into the fishing activities around Mulema, Mwika and Ndasa. Strong currents and destruction of gear by others reduce the value of the fishery.

EC, H

98. Stauch, A. 1966. Le bassin Camerounais de la Bénoué et sa pêche. Memoire ORSTOM No. 14 Paris 152 p.

A general description of fishing activity on the basin, a large section is devoted to fishing methods.

FM, G

T

99. Taylor-Thomas, A.O. 1976. A review of the fisheries of the River Gambia Fisheries Division, Ministry of Agriculture and Natural Resources, Fisheries Publication no. 31.

Gives a background to the fisheries of the river and some of its backwaters and proposes measures for the improvement of the fishery.

FY, RP

100. Thys van den Audenaerde, D.F.E. 1969. Report on a field-expedition through Sierra Leone, Liberia and Western Ivory Coast for the study of the local and natural Tilapia species Manuscript. FAO 18 p.

The author comments on the poor development of inland fisheries in Sierra Leone and on the movement of Fanti fishermen from Ghana inland to exploit the rivers in the dry season.

RD, SE

101. Tobor, J.G. 1970. A survey of the fisheries of the lower Yobe river in the North-Western basin of Lake Chad. Federal Fisheries occasional paper (12) 27 p.

A description of the fish, catch, gear processing and market channels of the fishery is given. An account of the use of calabashes instead of boats and clap nets is given.

CS, FG, MK

U

102. Uganda. 1956. Annual Report of the Games and Fisheries Department for the period 1 January 1954 to 30 June 1955. 138 p.

The catch for some small water bodies is reported as well as the sport fishing records.

CS

V

103. Vanden Bossche, J.P. 1989. Review of documents concerning fisheries and fish farming projects or activities in Burkina Faso available in the Fisheries Department, FAO, Rome. FAO. F1: TCP/BKF/8852. 26 P.

BB

104. Van Someren, V.D. 1959. A study of a small basket-trap: River fishing in Kenya East African Agricultural Journal. 24 (4): 257-267.

The author presents the results of a seven month observation of a small basket-trap fishery. Data on the biology of the species caught are given.

FB, FG, FM

105. Vidy, G. 1983. Pêche traditionnelle en bordure du Grand Yaéré nord-cameronais: Le Logomatia. Rev. Hydrobiol. trop. 16 (4): 353-372.

A description of the fishing gear and fisheries of the logomatia river, a tributary of the Logone river in the Grand Yaéré flood plain. Catch statistics for the period 1977-79 are given. The low catch recorded is attributed to the after effects of the drought of 1972-1973.

CS, FG, H

W

106. Welcomme, R.L. 1969. The biology and ecology of the fishes of a small tropical stream. J. Zool. Lond. 158: 485-529.

The author presents details of the breeding cycle of a number of fish species as well as population structure. Mention is made of the migratory habits of the fish.

FB

107. Welcommme, R.L. 1975. The fisheries ecology of African flood plains. CIFA Tech. Pap., (3): 51 p.

A summary of the general characteristics of flood plains including limnological and biological features. Fishing methods and fishery management are also discussed.

EC, L, FM, MG

108. Welcomme, R.L. 1976. Some general and theoretical considerations on the fish yield of African rivers. J. Fish Biol. 8 (5): 351-364.

An estimate of the annual yield of African rivers including the potential catch of small rivers is given. Calculated numbers of rivers of various sizes are presented.

P, ST

109. Welcomme, R.L. 1983. River Basins. FAO Fish. Tech. Pap. (202): 60 p.

This document gives a general account of the ecology and fisheries of river basins. A number of African examples relating to rivers and floodplains are given.

EC, G

110. Welcomme, R.L., and B. de Merona 1988. Fish communities of rivers. In: C. Lévêque, M.N. Bruton and G.W. Ssentongo Biology and Ecology of African Freshwater fishes. Editions de l'ORSTOM. Collection Travaux et Documents (216). Paris: 251-276.

Mention is made of the large numbers of small streams that exist on the African continent. Estimates of standing stock of a number of rivers is given. In their conclusion the authors stress the need for research work to be carried out on the fisheries of equatorial forested rivers.

EC, P, ST

111. Whitehead, P.J.P. 1958. Indigenous river fishing methods in Kenya E. Afr. Agric. For. J. 24: 111-120

A description of the fishing methods and the social organization of fishing groups is given.

FM, SE

112. Whitehead, P.J.P. 1959. The River fisheries of Kenya. Part I: Nyanza Province. E. Afr. Agric. For. J. 24 (4) 274-278.

A general account of the fisheries, mention is made of the importance of temporary streams and swamps.

G

113. Whitehead, P.J.P. 1960. The river fisheries of Kenya. Part II: The Lower Athi (Sebaki) River. E. Afr. Agric. For. J. 25 (4): 259-265.

Information the fishing methods and fishing effort is presented.

CS, FM

114. Willoughty, N.G., and R.S. Walker 1978. The traditional Fishery of the lower Shire Valley, Malawi. In: R.L. Welcomme (ed.) Symposium on river and floodplain fisheries in Africa. Bujumbura, Burundi 21-23 November 1977. Review and experience papers CIFA Tech. Pap. (5): 288-295.

The authors present the results of a survey on the fishery of the lower Shire Valley which includes the shallow Bangula lagoon.

CS

2.3 Small Dams

A

115. Awachie, J.B.E., and L. Hare 1978. The fisheries of the Anumbra, Ogun and Oshun river systems in Southern Nigeria. In: R.L. Welcomme (ed.) Symposium on river and floodplain fisheries in Africa, Bujumbura, Burundi, 21-23 November 1977. Review and experience papers CIFA Tech. Pap. (5): 170-184.

This paper projects the fisheries potential of the Anumbra, Ogun and Oshun basins in the light of planned hydrodevelopment. The Ogun and Oshun basins are predicted to be greatly influenced by barrages and other flood control measures.

H, P, RD

B

116. Bailey, R.G. 1966. The dam fisheries in Tanzania. E. Afr. Agric. For. J. 32 (1): 1-15.

This paper presents a review of dams in Tanzania and the various physical, chemical and biological factors which influence fish production. An account of fisheries development is also given.

EC, L, RD

117. Bailey, R.G. 1980. Aspects of fish ecology and fisheries development in Tanzanian impoundments. Tropical Ecology and Development. pp 921-926.

The stocking of small seasonal rainfed impoundments with tilapias is practiced in Tanzania. The results of this stocking is presented with the comparisons being made between old and new impoundments and natural populations.

EC, FB, P, RD

118. Balarin, J.B. 1986b. The status of fish farming in Zimbabwe and Future prospects. Zimbabwe Agric. J. 83 (1): 3-10

The author discusses the organization of fish farming in Zimbabwe and points out most of the production is from small farm dams.

AC

119. Bernacsek, G. 1984. Dam design and operation to optimize fish production in impounded river basins. CIFA Tech. Pap. (11): 98 p.

The paper seeks to rationalize dam construction with fish production. A number of points are presented to aid dam operators so as to optimise fish production down stream. A list of 146 small reservoirs across the continent are given in an appendix.

RD

120. Blay, J. 1985. Observations on the balance of fish populations in a small reservoir in Ghana. Fish. Res. 3 (1): 1-11.

This paper examines the population structure and community composition of the fish fauna of the Dawhenya irrigation dam.

C

121. Contrell, M.A. 1979. Possible environment changes in response to hydroelectric development of the hire river basin (Malawi) I: The aquatic environment. In: Kainji Lake Research Institute, Proceedings of the International Conference on Kainji Lake and River Basis Development in Africa. Ibadan, Nigeria 11-17 December 1977: 144-147.

The development of the fisheries of two proposed small reservoir is discussed briefly.

EC, EN, H, RD

122. Committee for Inland Fisheries of Africa. 1987. Report of the sub-committee for the protection and development of the fisheries in the Sahelian zone. Accra, Ghana 6-9 October 1986. FAO. Fish. Rep. (377): 27 p.

Paragraphs 9-14 give an overview of the particular developments and problems encountered in each of the Sahelian countries. The management of small water bodies and dams for fisheries was identified by the sub-committee as one of the major fisheries sectors of concern in the Sahelian zone.

D

123. Dadzie, S. and N. Odero 1989. The fish and fisheries of the man-made lakes in the Tana river basin, Kenya. In: M.M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.).

The catch of tilapia and Cyprinus fisheries in the Tana basin reservoirs indicate loss in biomass which the authors attribute to overfishing and variation in physico-chemistry of the waters after floods. Crocodile infestation is given as a major factor preventing full exploitation of the smaller reservoirs.

CS, EC, L, ST

124. Deceuninck, V. 1952. La pêche et la pisciculture au Bas- Congo. Publication de la Direction de l'Agriculture des Forêts et de l'Elevage Bruxelles. 67 p.

The fishery potential of a number of small rivers is discussed in the light of pond and dam construction.

P, RD

E

125. Elliott, O.O. 1979. The fisheries potential of river Oshun basin, Nigeria. In: Kainji Lake Research Institute, Proceedings of the International Conference on Kainji lake and river basin development in Africa. Ibadan, Nigeria 11-17 December: 348-354.

An estimate based on data in the literature, is given for the possible fisheries production of the Oshun basin if all the proposed hydro-development schemes were in operation.

H, P. RD

F

126. Fagade, S.O. 1983. The biology of Chromidotilapia guntheri from a small lake. Arch. Hydrobiol. 97 (1): 60-72.

Chromidotilapia guntheri from the IITAA reservoir was studied and aspects of length weight relationships, food habits, population structure and fecundity are reported.

FB

127. Fagade, S.O., A.A. Adebisi, A.N. Atando (1984). The breeding cycle of Sarotherodon galilaeus in the IITA Lake, Ibadan, Nigeria. Arch. Hydrobiol. 100 (4): 493-500.

The authors establish the size at maturity to be 13.4 cm for females and 16.6 cm for males. Females with mature ovaries were caught throughout the year.

FB

G

128. Gopalakrishnan, V. 1989. Aquaculture development potential in small reservoirs of Zambia. In M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies, Accra, Ghana, 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.).

The author points out the grave lack of knowledge of the fisheries development potential of small water bodies in Zambia. A number of case studies are presented to illustrate the implications of fisheries development in reservoirs. Attention is focussed on the potential of aquaculture in the small water bodies.

AG, P, RD

H

129. Hall, E.A. 1966. Utilizing farm dams for fish production Rhodesia Agric. Journal, 63: 27-28

The author stresses the value of farm dam fisheries and provides some information on types of fish, stocking as well as harvesting methods and management.

AC, MG, RP

130. Hayward, P.B. 1983. Production in Zambian Fisheries. In: P.D. Ncube (ed.) Agricultural Baseline Data for Planning, Lusaka, p 148-192.

The author suggests that stocking/restocking of the large number of existing ponds and cattle dams for fish production at the village level would make a real contribution to rural nutrition.

FP, MG, RP

I

131. Ita, E.O. 1978. A preliminary report on the fish stock assessment and management proposal for the IITA (Ibadan) irrigation and domestic water supply reservoir.

On the basis of a fishing survey and on four-year data base on catch records, a cropping scheme for the IITA reservoir is proposed. Data on gear selectivity is also given.

CS, MG, ST

132. Ita, E.O., S.O. Otubusin, I. Yaro, A. Mohammed and B. Ibitoye, 1979. Fisheries investigations in the Lafia Agricultural Development project area of Plateau State, Nigeria, Kainji Lake Research Institute, Nigeria. 63 p.

This report presents the results of a comprehensive fisheries investigation which provided estimates of the fisheries potential of the water bodies in the project area. A management plan for the area and a list of suitable sites for lagoon development is presented.

FP, MG, P, RD

133. Ita, E.O., E.K. Sado and A. Pandogari 1982. Preliminary survey of inland water resources in Nigeria with particular reference to fish ponds, natural lakes and flood ponds, large and small reservoirs. Ann. Rep. Kainji Lake Res. Inst. 1982. pp. 63-67.

The results of part of the survey are given. The survey is aimed at estimating the fish yield potentials of the water bodies.

L

134. Ita, E.O., E.K. Sado, J.K. Balogun, A. Pandogari and B. Ibitoye 1985. Inventory survey of Nigeria inland waters and their fishing resources. I. A Preliminary checklist of inland water bodies in Nigeria with special reference to ponds, lakes, reservoirs and major rivers. Kainji Lake Research Institute Technical Report series (14): 51 p.

A list of water bodies in Nigeria is presented, state by state. A total of 323 water bodies are given of which 231 are small water bodies or fish ponds.

L

J

135. Jackson, P.B.N. 1966. The establishment of fisheries in man-made lakes in the tropics. In: R.H. Lowe-McConnel (ed.) Man-Made Lakes., Academic Press New York: 53-73.

The author stresses the importance of fisheries development in new impoundments.

RD

136. Junor, F.J.R. 1969. Tilapia melanopleura Dum, in artificial lakes and dams in Rhodesia with special reference to its undesirable effects. Rhod. J. Agric. Res., 7: 61-69.

The author traces the introduction of Tilapia melanopleura in a number of small water bodies. Due to the food habit of the fish i.e., marginal vegetation, they are considered a menace to the management of other fish species.

EC, FB, MG

K

137. Kenmuir, D.H.S. 1981. Fish production and farm dams. Zimbabwe Agric. J., 78 (6): 209-214.

The results of a preliminary survey to document the national level of exploitation of fish populations of farm dams. An attempt is made to determine the fish production potential if all dams were efficiently used.

FP, P, RD

138. Kenmuir, D.H.S. 1982. Fish production prospects in Zimbabwe. Zimbabwe Agric. J. 79: 11-17.

The author gives an overview of the potential of fisheries in Zimbabwe. A section is devoted to small dams and some estimates of production are given.

CS, RD

M

139. Maar, A. 1956. Tilapia culture in Farm Dams in Southern Rhodesia. Rhodesia agric. J., 53: 667-687.

The author describes how to manage farm dam fisheries.

140. Maar, A. 1957. Fisheries exploitation in public dams. Proc. First Fisheries Day. S. Rhod. pp 44.

RD

141. Maar, A, 1959. Dams and drowned out stream fisheries in South Rhodesia. Proc. IUCN Tech. Mtg. IV. 139.

RD

142. Maar, A., M.A.E. Mortimer and I. van de Lingen 1974. Fish culture in central East Africa FAO Rome 160 p.

The authors discuss fish culture practices in dams.

AC

143. Mmopelwa, T.C. and E.J. Rogers 1989. Status of Botswana's fishery. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies, Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO. Fisheries Report (in prep.).

An overview of Botswana's fisheries is presented with the role of the potential for exploitation of small water bodies being highlighted. Estimates of the present annual production are given and a prediction on the future of small water body fisheries is given.

CS, FY, P

144. Mokhohlane, B.J.T. 1989. The development and management of fisheries in small water bodies in Lesotho. M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies, Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.)

This paper stresses the importance of small water bodies in developing the fishery potential of Lesotho. The government policy is to approach the problem from the view point of integrated rural development.

FY, P, RP

145. Mortimer, M.A.E. 1957. Three years fish catches from a conservation dam in Northern Rhodesia. Proc. First Fisheries Day S. Rhod. pp 32.

CS

146. Mortimer, M.A.E. 1959. Fishing in the Lundazi dam Rhod. Agric. J. 56 (3): 50-60.

A detail analysis of the monthly catch records from 1953-1958 are given. Data on gear selectivity are also given.

CD, FG

147. Mortimer, M.A.E. 1958. The fisheries of conservation dams in Northern Rhodesia. I. Chilanga Dams 1952-57, J.R.F.O., a.r 8, 42.

CS

148. Mortimer, M.A.E. 1961. A report on conservation dam fisheries in N. Rhodesia 1951 -1. J.F.R.O. A.R.11, 73

CS

149. Mortimer, M.A.E. 1964. A report on the conservation dams fisheries of N. Rhodesia, 1951-61. Rep. Fish Res. Org. Nth. Rhod. 11: 73-121

CS

150. Mortimer, M.A.E. 1965. Rod and line fishing in small ponds. Fish. Res. Bull. Zambia, (1962-63): 55-61.

The main conclusions are as follows: rod and line fishing did not remove all the fish, fishing activity stopped when catch per unit effort dropped below 250 gram per day and fish populations could recover from the effects of rod and line fishing.

FB, CS

151. Mortimer, M.A.E. 1967. A rational approach to fish culture in rural areas of Zambia. FAO Fish Rep., (44) Vol. 2: 143-153.

The author gives the fish yield of various sizes of conservation dams. The costs and benefits of family ponds, small holdings and conservation dams are compared and concludes that conservation dams show a better return than small family ponds.

CS, FP

152. Moriarty, C. 1979. A study of fish stocks in IITA Reservoir Ibadan, Nigeria. In: Kainji Lake Research Institute, Proceedings of the International Conference on Kainji Lake and river basin development in Africa. Ibadan. Nigeria 11-17 December 1977: 338-347

The author presents, on the basis of fishermen's catches, an account of the mesh selectivity, the breeding cycle and the yield of the principal species caught. 98% of the fishery is based on Saratherodon galilaeus.

CS, FB, FG

153. Motwani, M.P. and Kanwai, Y. 1970. Fish and fisheries of the cofferdammed right channel of River Niger at Kainji. In: S.A. Vissier (ed.) Kainji: a Nigerian man-made lake; vol. 1: ecology,: 27-48. NISER Ibadan.

EC

154. Mutsekwa, S.E. 1989. Government policy on the development of small water-bodies fisheries in Zimbabwe. In: M. Giasson and J.L. Gaudet (ed.s) Symposium on the development and management of fisheries in small water bodies, Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO. Fisheries Report (in prep.).

This short paper outlines the policy directions that the government of Zimbabwe wishes to follow in order to develop fisheries in small water bodies in view of their important fisheries potential.

FY, RD

P

155. Palm, R. 1989. Management of community small water bodies for fish production in Africa. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana, 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.)

The author reviews information on the history construction and management of small reservoirs for which community fishery development was the major objective. The author reports that most of these schemes have failed due to mainly social and cultural reasons. A number of case studies are presented.

RD, SE

156. Payne, A.I. 1974. Some characteristics of the fish fauna of a dam in the Lake Victoria region of Tanzania including the effects of multi-specific stocking with Tilapia species.

This paper reports on the establishment of tilapias in the Malya dam in Tanzania.

FB

R

157. République Unie du Cameroun 1983. Étude de l'aquaculture et de la pêche continentale; Identification des potentialités piscicoles des plans d'eau naturelle et artificielle. Ministère de l'élevage, de Pêches et des Industries animales, Direction des Pêches. Volume 5. pp 101.

This document, prepared by Sagreah of France for the Government of Cameroun, gives an overview of the measures needed to develop inland fisheries including the stocking of small water bodies.

RD

158. Republic of Zambia, 1985. Fisheries (Annex) Investment Plan Taskforce, Planning Division Ministry of Agriculture and Water Development, Lusaka, 155 p.

Brief mention is made of the contribution of small fisheries to Zambia in serving the local population.

RP

159. Roggeri, H. 1985. African dams. Impacts in the environment. A case study of five man-made lakes in Eastern Africa. Environmental Liaison Centre, Nairobi. 63 p.

Provides fish production data for Gitaru and Kamburu, both man-made lakes for 1981 and 1982.
Fournit des données sur la production de poissons dans les lacs arificiels de Gitaru et Kamburu pour 1981 et 1982.
CS

S

160. Shimang, G.N. 1989. The development and management of fisheries in small water bodies in Nigeria. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.).

The author presents the government of Nigeria's policies, objectives and strategies for fisheries development in small water bodies. Stress is also laid on the need for an inventory of small water bodies and their potential yields.

FP, FY

161. Sivalingma, S. 1974. A guide to the construction of fish ponds. Federal Department of Fisheries, Federal Fisheries occasional Paper (20) 64 p.

The author mentions the potential of borrow pits to support fisheries.

P

162. Song, Z. 1980. Manual of small scale reservoir fish culture. FAO Fish. Circ. (727): 18 p.

The potential of small-sized reservoirs for fish production is discussed, the author also describes how to select species for stocking, how to manage and feed as well as harvesting technique. The manual is aimed at serving the needs of extension workers.

EX, MG, P

T

163. Toots, H. 1974. Farm dams for fish production. Rhodesia agric. J., 71: 133-138.

The author gives a simple account of how to go about setting up a dam fishery.

MG

V

164. Van der Lingen, T. 1960. Weed control in dams and irrigation channels. Rhodesia Agric. Journal 57: 353-358.

The stocking of farm dams with Tilapia melanopleura to control aquatic weeds is suggested.

EC, EM

Y

165. Yousif, O.M. 1985. Fish culture in western Sudan. ICLARM Newsletter 8 (4): 14.

The stocking of reservoirs in western Sudan with tilapia started in 1957, aimed at providing protein and jobs. Lack of interest because of cultural and economic factors has not led to success of the venture.

MG, RD, RP, SE

2.4 Small Natural Lakes

B

166. Bell-Cross, G., and J.L. Minshull 1988. The fishes of Zimbabwe. The Trustees of the National Museums and Monuments of Zimbabwe, Harare. 294 p.

The author presents a short section on commercial fishing in Zimbabwe. The productivity of small streams and vleis is mentioned.

CS

167. Blaber S.J.M. 1988. Fish communities of South East African coastal lakes. In: C. Lévêque, M.N. Bruton and G.W. Ssentongo. Biology and Ecology of African Freshwater fishes. Éditions de l'ORSTOM, collection Travaux et Documents (216) Paris 351-362

Information on the estuary linked Lake Swartvlei, (number of fish species, feeding habit) is given.

FB

168. Bonzon, A. 1988. Tanzania: Contribution to the formulation of a five year plan for the fisheries sector. FAO. Fl: TCP/URT/6763 205 p.

A brief presentation on small and medium water bodies is made. The author draws attention to the need to link under exploited water bodies to major markets.

MK

C

169. Centre Technique Forestier Tropical 1970-1980. Annual Reports 1970-1980, Les recherches sur la pêche continentale et la pisciculture.

These annual reports present some basic data on the fish and fisheries of tropical forests. Information on catch composition from various African lakes are presented. From 1976 an increasing emphasis has been placed on aquaculture.

AC, CS, FB

F

170. FAO/UN 1988. Technical cooperation programme, Tanzania. Report on southern Regions mission. A report prepared for the project assistance to Fisheries Planning Management and Development based on the work of R.J. Campbell and Mr. Moreni. 29 p.

Information on water bodies, catch, fishing gear, processing transport and marketing, major constraints as well as development options are given for the five southern regions of Tanzania.

CS, FG, MK

L

171. Lema, R. 1989. Minor water fisheries development and management in Tanzania. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana, 7-8 December 1987. Summary of proceedings and selected papers FAO Fisheries Report (in prep.).

The author considers the food needs of the rural people in relation to the lack of attention given to the fisheries potential of small water bodies.

P, RD, RP

M

172. Morgan, N.C. 1982. An ecological survey of standing waters in North west Africa ; 1 Rapid Survey and Classification Biol. Conserv. 24 (1) 5-44.

An assessment of the conservation value of wetlands and open waters was made for Tunisia, Algeria and Morocco.

EC, EN

173. Morgan, N.C. 1982b. An ecological survey of standing waters in North West Africa: III site descriptions for Morocco. Biol. Conser. 24 (3) 161-182.

The author gives outline ecological description for 24 lentic waters in Morocco. Data on the physical nature, aquatic vegetation, invertebrates, water fowl and in some cases fisheries is given. An assessment of the conservation value for each of the waters is made.

EC, EN

174. Morgan, N.C. 1982c. An ecological survey of standing waters in North west Africa: II site description for Tunisia and Algeria. Biol. Conserv. 24 (2): 83-113.

The author gives outline ecological descriptions for 39 lentic waters in Tunisia and Algeria. He also comments on the value of each site for conservation.

EC, EN

O

175. Okaronon, J.O. 1987. Development and management of fisheries in small water bodies of Uganda with particular reference to Lake Wamala. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.)

The paper concentrates mainly on the fish and fisheries of Lake Wamala (100-120 km^2). Mention is made of some small water bodies and some recommendations for their development are given.

FY, RD

R

176. Republic of Botswana 1985. Botswana Fisheries, status and development strategies. Ministry of Agriculture, Norwegian Ministry of Development Cooperation, 282 p.

A comprehensive overview of fisheries in Botswana, the document gives policy guidelines for fishery development. The catch statistics for a few small water bodies and the fishing methods used are presented.

CS, FM, FY, RD

177. Republic of Zambia 1970-1975. Annual reports for the years 1968-1973. Ministry of Lands and Natural Resources, Department of Wildlife, Fisheries and National Parks.

The catch from the Lusiwashi fishery is reported.

CS

T

178. Tanzania 1965. The 1965 annual report of the Fisheries Division of the Ministry of Agriculture, Forests and Wildlife. 26 p.

In the section on minor water fisheries reference is made to the vast untapped reserve of protein which these water bodies hold.

P

179. Tanzania 1966. Annual report of the Freshwater fisheries of Tanzania. 16 p (Typewritten, no author or executing agency). This document which could have originated from the Fisheries Department of Tanzania presents catch statistics and numbers of fishermen for the minor fisheries in Tanzania.

P

2.5 Small Coastal Lagoons

E

180. Elster, H.J. and K.W. Jensen 1960. Limnological and fishery investigations of the Nozha-Hydrodrome near Alexandria, Egypt, 1954-1954. Min. Agr. Egypt, Hydrobiological Dept. Notes and Memoire No. 43.

FB, L

181. Ezzat, A., A.M. El Maghraby and M.T. Hashem 1977. Age and growth of Mugil capito (C. and V.) in Nozha Hydrodrome, Alexandria, A.R.E. Bull. Inst. Oceanogr. Fish. Cairo, 7 (1): 191-206.

Faster rates of growth are found in the Hydrodrome than in natural waters. The commercial fishery depended upon fish of age groups III and IV.

FB

F

182. FAO/UN 1979. Role of fishery technology in the management and development of freshwater fisheries in Africa. CIFA Tech. Pap. (6): 67 p.

This paper reviews the state of fishing technology in Africa, sections are devoted to Lagoons and to shallow lakes.

FG

183. FAO 1984. Small scale fisheries: a new approach. The Courier No. 85: 91-93.

This paper presents an outline of an FAO/DANIDA programme for the development of small scale fisheries along the coast of West Africa.

RD

G

184. Gordon, C. 1989. Fisheries in small water bodies: The case of the Anansuri Wetlands. In: M. Giasson and J.L. Gaudet (eds.) Symposium on the development and management of fisheries in small water bodies. Accra, Ghana 7-8 December 1987. Summary of proceedings and selected papers. FAO Fisheries Report (in prep.)

The author presents a case study of the fishery of a small water body, with details of estimated catch. A description of traditional management strategies used in the wetland which help sustain the fishery is given.

CS, P, RP

H

185. Hashem, M.T. 1973. The feeding and fatness of Labeo nitolicus Forsk in the Nozha-Hydrodrome. Bull. Inst. Ocean. Fish A.R.E. 3: 85-94.

Samples from the commercial catch of the Nozha-Hydrodrome were taken and analysed for fat content and feeding habit.

FB

186. Hashem, M.T. and K.A. Hussein 1973. Some biological studies of the Nile perch (Lates niloticus) C. & V.) in the Nozha-Hydrodrome. Bull. Inst. Ocean. Fish. A.R.E. 3: 363-393.

Calculations on length age growth and weight are presented with notes on the general behaviour of Nile perch.

FB

187. Hashem, M.T., T.A. Soliman and A.A. Al-sayes 1973. Selectivity of gill and trammel nets for Cyprinus carpio and Barbus bynni of the Nozha-Hydrodrome. bull. Inst. Ocean. Fish. A.R.E. 3: 337-361.

The authors used nylon gill and trammel nets of different mesh-sizes in the Nozha-Hydrodrome to study their efficiency in capturing common carp and Barbus bynni. They present data on the most suitable mesh size of net which will provide fish of a marketable size and ensure an adequate breeding population.

FB, FG

188. Hashen, D.T. 1977a. Population characteristics of Bagrus bayad in the Nozha Hydrodrome during 1968-1970. Bull. Inst. Ocean. Fish A.R.E. 7: 207-224.

The author analyses the length frequence and the age composition of the commercial catch of Bagrus bayad from the Nozha Hydrodrome.

FB

189. Hashem, M.T. 1977b. Age determination and growth studies of Bagrus bayad in the Nozha Hydrodrome. Bull Inst. ocean. Fish. 7: 225-245.

The author uses vertebrae to age specimens of Bagrus bayad collected for the commercial catch of the Nozha Hydrodrome.

FB

190. Hashem, M.T., and A. El-Agamy 1977. The effect of fishing and maturation on the Barbus bynni population of the Nozha Hydrodrome. Bull. Inst. Ocean. Fish A.R.E. 7 (1): 137-151.

The authors present information on the decrease in catch of Barbus bynni. They also present a historical account of the Hydrodrome and its fishery.

CS, FB

191. Hashem, M.T. and S. Fayek 1977. Age determination and growth studies on the Barbus bynni in the Nozha Hydrodrome. Bull. Inst. Ocean. Fish. A.R.E. 7: 153-167.

Information on the biology of Barbus bynni in the Nozha Hydrodrome are presented.

FB

K

192. Kapetsky, J.M. 1983. Some fishery characteristics of coastal lagoons and estuaries, paper presented to the ACMRR Working Party on the management of living resources in the near-shore tropical waters. Rome, Italy, 28 February - 4 March 1984. Working paper (7): 47 p (mimeo).

MG

M

193. Mensah, M.A. 1979. The hydrology and fisheries of the lagoons and estuaries of Ghana Mar. Fish. Res. Rep. Tema, (7): 14 p.

An overview of the fisheries in some of the lagoons of Ghana is given. An account of the prevalent fish types and the socio-economic impact of the lagoons and estuaries is also presented.

F, SE

P

194. Panayotou, T. 1982. Management concepts of small-scale fisheries: Economic and Social aspects. FAO. Fish. Tech. Pap., (228): 53 p.

The author analyses the concepts required for the management of small-scale fisheries. He presents some examples of traditional fishing strategies in the lagoons of the Ivory Coast.

MG, SE

195. Pauly, D. 1976. The biology, fishery and potential for aquaculture of Tilapia melanotheron in a small West African Lagoon Aquaculture 7: 33-49.

Data or the fishing effort and catch statistics of the tilapia fishery of the Sakumo lagoon are presented.

AC, CS, FB, P.

196. Pauly, D. 1987. On reason, mythologies and natural resource conservation Naga 10 (4): 6-7.

The author uses his experiences on the Sakumo Lagoon to illustrate how traditional beliefs and practices may help conserve fishery resources.

MG

197. Pillay, T.V.R. 1971. Report of travel to Tunisia for a rapid survey of lagoon fisheries and aquaculture. FAO Fisheries Travel Report 565: 6 p.

This report presents data on the catch of lagoons at Kelbia and Monastir.

AC, CS

R

198. Republic of Sierra Leone 1974. The Sierra Leone Fisheries Development Programme. Project Report. Ministry of Agriculture and Natural Resources. 200 pp.

Appendix VII deals with the potential fisheries in inland waters. The authors mention the low population density around the small coastal lagoons which they attribute to the difficulty in fishing them.

P, RD, SE

W

199. Weigel, Y.J. 1985. Traditional management of some lagoons of the Gulf of Guinea. FAO Fisheries Cir. No. 790, 28 p.

A background and description of traditional strategies governing use of lagoons in Ivory Coast, Ghana, Togo and Benin is given. The future role that these methods may play in fisheries developed is discussed.

FP, MG

200. Welcomme, R.L. 1972. A description of certain indigenous fishing methods from Southern Dahomey. A.J. Trop. Hydro. Fish. 1 (2): 129-140.

The various types of fish brush parks 'Acadjas' used in southern Dahomey (now Benin) are described. The catch of permanent pools and swamps 'Whedos' in the Ouémé floodplain is also documented.

CS, FM

201. Welcomme, R.L. and J.M. Kapetsky 1981. Acadjas: The brush park fisheries of Benin, West Africa. ICLARM Newsletter 4 (4): 3-4.

The authors describe the use of acadjas to enhance fish production in the lagoon fisheries of Benin.

FM

2.6 Other Water Bodies

B

202. Blaber, S.J.M. and D.P. Cyrus 1983. The biology of Carangidae (Teleostei) in Natal estuaries. J. Fish. Biol. 173-188.

The occurence and abundance of 17 species of Carangidae in some small estuaries in Natal are described. Their role is discussed in relation to their ecological significance in estuaries as predators and their degree of estuaries dependence.

FB

F

203. Federal Republic of Nigeria 1978. Report of the Review panel on Cooperative principles, laws and regulations in Nigeria. Federal Ministry of Information, Lagos, Nigeria, 80 p.

The document stresses the need for groups of fishermen in the creek, lagoon, riverine dam and lake areas to be formed into cooperative societies for the purpose of fishing and marketing jointly.

MK, SE

G

204. Gerhadsen, G.M. 1966. Report on Fisheries education problems in Ghana, Sierra Leone, Nigeria, Tanzania, Kenya and Uganda. FAO Fisheries Report (35): 50 p.

Mention is made of the importance of creek fisheries though no estimate of catch is given.

G, T

H

205. Hastings, R.E. 1972. Fisheries Research Unit, Lower Shire: Interim Report 1970-1972 Fisheries Department, Zomba Ministry of Agriculture and Natural Resources, 100p.

Catch statistics for some small swamps are presented.

CS

206. Hastings, R.E. 1973. Fisheries Research Unit, Lower Shire: Report 1970-1973 Fisheries Department, Lilongwe Ministry of Agriculture and Natural Resources, 112 p.

Catch statistics of some small swamps and lagoons are presented.

CS

207. Hildrew, A. 1981. The ecology of temporary inland waters; speculations on their potential in East Africa. Proc. Workshop of the Kenya Marine and Fisheries Research Institute on the aquatic resources of Kenya. pp 309-315.

The potential of Kenyan temporary inland waters regarding fish production is examined. The possibility of production of fish or fish food in irrigation dams, extensive areas of rainfed pools, floodplain pools and rice paddies is considered.

P, RD

K

208. Kapetsky, J.M. 1981. Some considerations for the management of coastal lagoon and estuarine fisheries. FAO Fish. Tech. Pap. (218): 47 p.

This report seeks to synthesize the information available on the management of capture fisheries in developing countries. A number of African examples are used especially in the section on non-regulatory management of lagoon and estuarine fisheries.

MG

L

209. Little, M.C., P.J. Reay and S.J. Grove 1988. The fish community of an East African mangrove creek.

The authors present the results of a beach seine survey, the ichthyofauna from the creek is compared to a nearby lagoon site and with other mangrove and estuarine systems. The results suggest that the species which use the creek as a nursery area enter the system principally at a post-larval/juvenile stage of development.

FB

P

210. Pillay, T.V.R. 1967. Estuarine fishes of West Africa. In: G.L. Lauff (ed) Estuaries. American Association Adv. Sci. Washington

FB

R

211. Reed, W. 1967. Notes for training course on swamp fisheries management. Fisheries section, Ministry of Agric. 16 p.

This document, prepared as a handbook for the training course at Lokoja, explains in very simple terms how to construct dams where fish fences have been traditionally used in the past.

T

V

212. Vallet, F. 1977. L'exploitation du lac de Monastir. Off. Natl. Pêche (Tunisia) 1 (1) 73-81.

Lake Monastir is a converted salt pan. Some fish species are continually present and have been exploited since 1971.

CS

213. Vinckie, M. 1972. Liberia - inland fisheries and fish culture development. A report prepared for the development of rice cultivation project. FAO Rome WS/D469 31 p.

A brief section on the management of natural waters including small water bodies is presented.

MG

W

214. Wangila, R.C.C. 1981. A review of growth of tilapia species in ponds. Proc. Workshop of the Kenya Marine and Fisheries Research Institute on aquatic resources of Kenya; pp 184-191.

The growth of tilapia in ponds and small impoundments is discussed in detail with attention being directed to the problem of stunting.

AC, FB

3. COUNTRY INDEX

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